DOCUMENT RESUME

ED 147 122 SE 023 300

TITLE	National Environmental/Energy Workforce Assessment for District of Columbia.
INSTITUTION	National Field Research Center Inc., Iowa City, Iowa.
SPONS AGENCY	Environmental Protection Agency, Washington, D. C.
PUB DATE	77
GRANT	EPA-T-900591010
NOTE	93p.; For related documents, see SE 023 292-360; Contains occasional colored pages
EDRS PRICE	MF-$0.83 HC-$4.67 Plus Postage.
DESCRIPTORS	Air Pollution Control; *Career Opportunities; *Educational Programs; Energy; Environment; *Manpower Needs; Pesticides; *Pollution; Post Secondary Education; Radiation; *State Legislation; Water Pollution Control
IDENTIFIERS	*District of Columbia; Noise; Solid Wastes

ABSTRACT

This report presents existing workforce levels, training programs and career potentials and develops staffing level projections (1976-1982, based on available information for the District of Columbia. The study concerns itself with the environmental pollution control areas of air, noise, potable water, pesticides, radiation, solid waste, wastewater, and energy. The format includes workforce profiles, projections, growth and career options for each of the areas investigated. Additional sections of the report outline state legislation and selected post secondary institutions with formal Environmental/Energy programs. A state profile and summary is included for cross-reference. The selected bibliography is appended in the Region III report. This document is one in a series of 69 which presents information for each of the states, Puerto Rico, and the Virgin Islands, and national and regional summaries. (CS)

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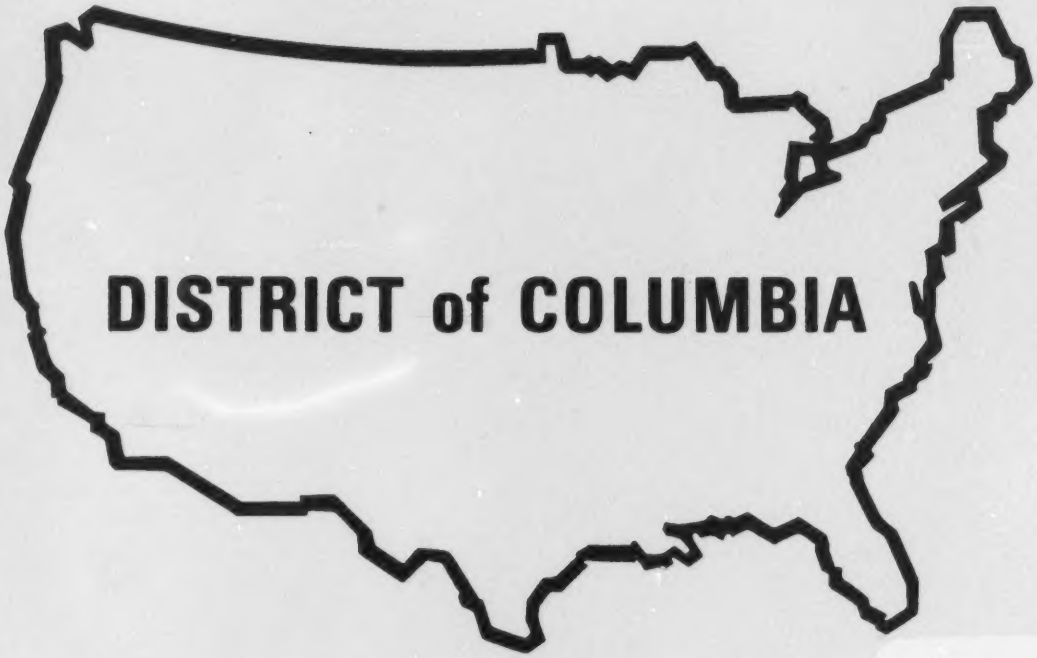
A National Environmental/Energy Workforce Assessment



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NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

for

DISTRICT of COLUMBIA

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

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ACKNOWLEDGEMENT

Valuable support and assistance for this report were provided by the District of Columbia Department of Environmental Services. Appreciation is extended to Mr. John Brink of the Environmental Health Administration for contributing information concerning air and water pollution in the District of Columbia. Contributing insight on water supply and pollution control was Mr. Mather of the Bureau of Air and Water Quality Control. Noise pollution information was provided by Mr. Barnwell of the Industrial Hygiene and Noise Control Division. Of equal importance was the information provided by Mr. Richard Lane of the Bureau of Industrial Hygiene and Radiological Health.

Contributing insight on the District's solid waste management program were Ms. Mary Redmiles of the Department of Environmental Services. Special thanks also go to Mr. Arnold Clark of the Department of Environmental Services for providing information on the pesticide regulatory program.

PREFACE

This report presents existing workforce levels, training programs, and career potentials and develops staffing level projections (1976 - 1981) based on available information for the District of Columbia in the environmental pollution control areas of air, noise, pesticides, potable water, radiation, solid waste, waste water, and energy. This study was carried out for the United States Environmental Protection Agency by National Field Research Center of Iowa City, Iowa.

The information and data presented in this report were compiled in large part from extensive interviews with professionals working in the respective areas and were supplemented by telephone surveys and research.

FOREWORD

The material herein contains the information and data collected for eight individual pollution control inventories conducted for the District of Columbia. The format includes workforce profiles, projections, growth and career potential for each of the areas investigated. Growth projections are necessarily based on best professional estimates developed from available information and represent what are felt to be realistic figures by experts in the respective areas. The pollution control areas considered by this study are as follows:

Air

Noise

Pesticides

Potable Water

Radiation

Solid Waste

Wastewater

Energy

National Environmental Energy
Workforce Assessment

Phase I

DISTRICT of COLUMBIA

Summary

I. AIR

The District of Columbia's Department of Environmental Services has overall authority for the implementation of the State Implementation Plan for the National Capital Air Quality Control Region. The Department's Bureau of Air and Water Quality Control has program responsibilities for the control and abatement of the District's air pollution.

The Bureau's Air Quality Division is staffed with chemists, civil, mechanical, and chemical engineers. Although the Bureau's air program is not projected to increase in staffing by 1982, it is anticipated that careers in the private sector will continue to develop for technicians and other semi-professional personnel, rather than for engineers or other highly educated professionals. These jobs are expected to be created as a result of more advanced control process technology. The private sector will require technicians to maintain this advanced control process technology in proper operating condition. Personnel are also needed who can determine whether or not polluters are continually in compliance with ambient air quality standards.

The Bureau's Air Quality Division may recruit additional personnel but only if EPA promulgates new standards or additional amendments to the Clean Air Act are enacted by Congress. Under these circumstances, it is likely that engineers, chemists, and technicians would be recruited.

II. NOISE

Noise control activities are the responsibility of the Department of Environmental Services' Environmental Health Administration. Prior to the Department's reorganization in 1976, noise control was conducted by Bureau of Occupational and Institutional Hygiene personnel. At present, the Bureau responds to citizen complaints regarding excessive levels of noise pollution using sound level monitoring equipment.

The District of Columbia has zoning and vehicle ordinances which include acoustical criteria and a nuisance regulation. Enforcement authority has been delegated to the District Police Department. The Division assists the police in a technical advisory capacity.

Noise legislation is currently pending before the District government which is designed to set limits on community noise levels with acoustical criteria included in the regulations. If the legislation is implemented by the Bureau, an additional eight positions would be created to satisfy its provisions. One electrical engineer would be needed to repair equipment. An urban planner would be required to conduct studies on traffic noise problems and on other areas. Six technicians would be recruited to perform monitoring tasks. At present, the Bureau is staffed by temporaries and the legislation would require permanent staff to carry out its provisions.

III. PESTICIDES

The Department of Environmental Services is the designated lead agency for implementation of the District's State Plan for the Certification of Applicators. The District government has proposed legislation before it called the Pesticide Operations Act that authorizes the creation of a program to satisfy the provisions of the Federal Fungicide, Insecticide, and Rodenticide Act as amended. However, this new Pesticide Act has been delayed in its passage.

A new Hazardous Chemical Control Division is to be created under the Department's Bureau of Consumer Health Services. The Division is to have authority under the Pesticide Operations Act to regulate the use and application of pesticides. The Department of Economic Services is to have authority to issue, deny, suspend, or revoke licenses of pesticide applicators, wholesalers, distributors, and retailers. The Cooperative Extension Service of the District of Columbia is to participate in training activities and administering examinations.

Four additional consumer safety officers are expected to be recruited in the next few years to provide the Hazardous Chemical Control Division with an inspection capability. These persons are expected to be experienced in the use and application of pesticides. Commercial applicators, according to the State Plan, are to have their licenses renewed annually, whereas private applicators are to renew theirs tri-annually to retain active certified status.

IV. POTABLE WATER

The Washington Aqueduct, operated by the Army Corps of Engineers, is the District of Columbia's principal water supply. Water supply program activities are the responsibility of the Department of Environmental Services' Environmental Health Administration and Water Resources Administration. The Bureau of Air and Water Quality Control and the Environmental Health Administration enforces District regulations, and the Water Resources Management Administration maintains distribution systems and water meters. The Department has expressed an intent to EPA to assume primacy for the federal Safe Drinking Water Act (SDWA).

The Bureau is staffed with civil and sanitary engineers. Environmental Health Technicians collect water samples for laboratory analysis. Once primacy is assumed for SDWA, additional engineers, chemists, bacteriologists, and technicians will need to be recruited to enforce the Act.

The Water Resources Management Administration is professionally staffed with civil and mechanical engineers. Water Services Workers, meter installers, consumer services representatives, and various other semi-professional positions make up the bulk of the Administration staff. It is not anticipated that the Water Resources Management Administration offices will grow due to budget constraints,

V. RADIATION

Radiation control activities are located within the Department of Environmental Services' Environmental Health Administration. Program activities have recently been transferred from the Bureau of Institutional Hygiene and Radiological Health to a new Bureau of Occupational and Institutional Hygiene as a result of reorganization.

The Radiological Health Section is responsible for regulating sources of both non-ionizing and ionizing radiation. The District government recently enacted enabling legislation to regulate users of radioactive materials. This legislation paves the way for the District to enter into a Federal-State agreement with the Nuclear Regulatory Commission to regulate users of radioactive materials. This section is principally staffed with health physicists and chemists and, at the present time, no additional staff are anticipated to be recruited by 1982. If funding does eventually become available to the Radiological Health Section as a result of the acquisition of new program responsibilities, two public health physicists may be recruited to inspect users of radioactive materials in accordance with their Agreement State authority.

VI. SOLID WASTE

The District of Columbia manages its solid waste primarily through the use of an incinerator and a sanitary landfill. The Department of Environmental Services' Solid Waste Management Adminstration has program responsibilities for solid waste management activities.

A Bureau of Solid Waste Collection, a Bureau of Solid Waste Disposal, and an administrative unit make up the Solid Waste Management administration. The Bureau's collection force consists of 916 persons including sanitation workers, motor vehicle operators, and support personnel. The Bureau of Solid Waste Disposal has 232 persons on its staff who are mainly landfill/ incinerator operators, engineers, motor vehicle operators, mechanics, and sanitation workers. Unless positions are recruited to operate resource recovery operations, it is not anticipated that additional positions will be made available to the Solid Waste Management Administration. However, it is also possible that additional chemical engineers and other professionals may be hired for hazardous waste management activities, but no information is available concerning this area at this time.

It is possible that the District's incinerator may be converted to a steam producing plant. Residue produced as a result of its operations could be used as an aggregate in asphalt to pave the District's streets. Specific projections of increased workforce needs concerning resource recovery operations are not available at present as many operations are currently still in their planning stages.

VII. WASTE WATER

The District of Columbia's Department of Environmental Services has overall administrative responsibility for implementing wastewater pllution control as mandated by the Federal Water Pollution Control Act (FWPCA). Under the Environmental Health Administration, the Bureau of Air and Water Quality Control has program responsibilities over its Division of Water Hygiene Control. The U.S. Environmental Protection Agency (EPA) currently has the authority to issue permits under the National Pollutant Discharge Elimination System (NPDES). The Division principally enforces District water quality regulations and the Bureau's Division of Engineering Services provides review of plans and specifications of construction grant activities involved in the upgrading of the Blue Plains Wastewater Treatment Plant, which is the District's sole treatment facility.

The Blue Plains facility, which is currently being upgraded, is the responsibility of the Department's Water Resources Management Administration. It is expected that by 1978, the Blue Plains Plant will have to recruit an additional 200 personnel. The Administration's Bureau of Water and Sewage Services maintains the District's distribution systems, treatment plants, and facility maintenance.

The Bureau of Air and Water Quality Control is primarily staffed by sanitary and civil engineers and environmental health technicians. Only the Blue Plains Waste Water Treatment Plant expects to recruit additional personnel.

VIII. ENERGY

The District of Columbia does not have a state energy agency at the present time.

DISTRICT OF COLUMBIA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	19	19	19	19	19	19	N/A
NOISE[2]	4	8	12	12	12	12	30%
PESTICIDES[3]	13	14	15	16	17	17	6%
POTABLE WATER[4]	186	186	186	186	186	186	N/A
RADIATION[5]	5	5	5	5	5	5	N/A
SOLID WASTE[6]	1,151	1,151	1,151	1,151	1,151	1,151	N/A
WASTEWATER[7]	311	311	311	311	311	311	N/A
ENERGY[8]	--	--	--	--	--	--	N/A
TOTALS[9]	1,689	1,694	1,699	1,700	1,701	1,701	N/A

[1]The above represents only personnel of the Air Quality Division.

[2]The above does not include law enforcement agencies or the private sector.

[3]The above includes state program personnel, but does not include an estimated 130 federal, 302 commercial, and 20 private applicators requiring certification.

[4]The above includes only personnel of the Bureau of Air and Water Quality Control and the Water Resources Management Administration.

[5]The above includes personnel of the Radiological Health Section.

[6]The above does not include the private sector.

[7]The above includes personnel of the Bureau of Air and Water Quality Control and the Water Resources Management Administration.

[8]The District of Columbia does not have an energy agency at the present time.

[9]Insufficient data to make realistic projections.

EDUCATION

George Washington University offers numerous career options in the environmental disciplines. The College of Law offers both L.L.M. and J.S.D. degrees in Environmental Law. The College of Engineering awards both undergraduate and graduate degrees in Environmental Civil Engineering. Other advanced degrees available through the College of Engineering include: Environmental Modeling; Acoustics; and Energy, Resources, and Environment.

Through its Continuing Education Program, George Washington University offers a variety of environmental and energy related programs. During the last year, the university offered short courses and seminars in energy conservation, environmental law, solar heating and cooling, preparing environmental impact statements, and numerous other related topics.

Several of the degree programs available at George Washington are reviewed in the State Report. The Report contains detailed information on student enrollment and course offerings.

Other than the degree programs offered through George Washington Universities, career options in environmental disciplines are limited in colleges and universities located within the District of Columbia. Nevertheless, individual courses related to general environmental concerns are available at other colleges and universities in Washington, D.C.

LEGISLATION

The environmental/energy legislation for District of Columbia was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Pollution Control Act

Solid Waste Law

Federal Water Pollution Control Act

National Environmental Energy
Workforce Assessment

Phase I

DISTRICT of COLUMBIA

Report

DISTRICT PROFILE

The District of Columbia is the seat of the federal government, located on the Potamac River on the west-central boundary of Maryland opposite Virginia. The original 100 square mile area taken from Virginia and Maryland was reduced to 67 square miles when the portion south of the Potomac was returned to Virginia in 1846. The 1975 estimated population was 716,000. The District has existed as a municipal corporation since 1871. It embraces Washington, Georgetown, and Washington County.

DISTRICT OF COLUMBIA POLLUTION CONTROL AND ABATEMENT AGENCIES

The District of Columbia Department of Environmental Services is the District's principal environmental agency. The Department has primary responsibility for air, noise, pesticides, potable water, radiation, solid waste and wastewater programs. The Department is composed of three offices and four administrations. The Offices are the Office of Special Services, the Office of Environmental Planning and Management, and the Office of Executive Management. The Administrations are the Engineering and Construction Administration, the Environmental Health Administration, the Water Resources Management Administration and the Solid Waste Management Administration.

The Department of Environmental Services provides advice to the Mayor-Commissioner and the City Council of the District on matters which concern the city's environmental quality. The Department also functions to develop and execute major environmental plans, programs, policies, and special activities so as to protect the District of Columbia's air, water, land and living resources.

The Environmental Health Administration is composed of a Bureau of Air and Water Quality Control and a Bureau of Occupational and Institutional Hygiene, a Bureau of Community Hygiene, and a Bureau of Consumer Health Service. The first bureau has responsibility for the District's air pollution control program and portions of the wastewater and water supply program. The Water Resources Management Administration is also active in the water programs. The Bureau of Occupational and Institutional Hygiene was recently created from the Bureau of Institutional

Hygiene and Radiological Health. This Bureau has responsibilities for the radiation control and noise control programs.

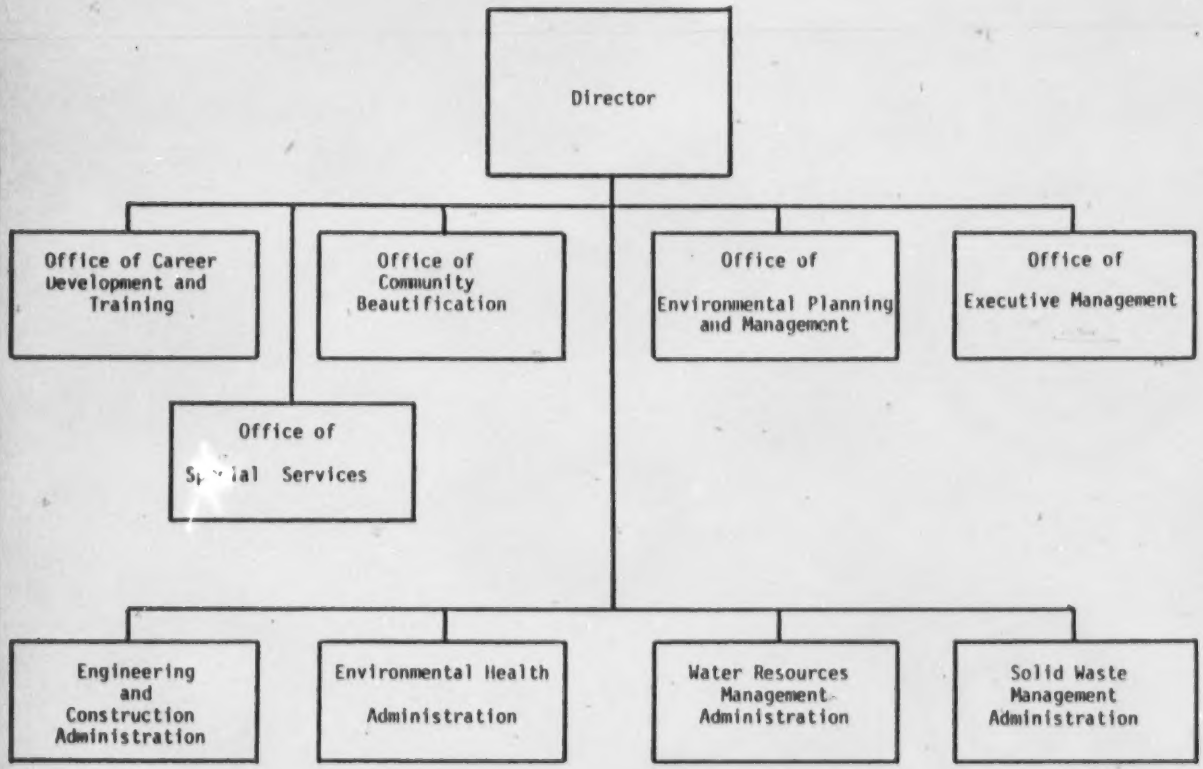
The Solid Waste Management Administration has responsibilities for the District's solid waste collection and disposal force. It is composed of an administration unit, a Bureau of Solid Waste Collection, a Bureau of Solid Waste Disposal, and a Bureau of Facility Maintenance. The Water Resources Management Administration is composed of an Office Planning and Research, a Bureau of Water and Sewer Services, a Bureau of Wastewater Treatment, and a Bureau of Maintenance Services. This Administration is responsible for the operation and maintenance of the District's Blue Plains Wastewater Treatment Plant and the distribution of the District's water supplies. The District's water supply is provided by the Army Corps of Engineers at the Washington Aqueduct.

The District did not have a formally organized pesticide regulatory agency before the State Plan for Certification of Pesticide Applicators was submitted to the U.S. Environmental Protection Agency. The Department of environmental Services is the lead agency for the implementation of this plan. Within the Environmental Health Administration's Bureau of Health Inspection Services, the Hazardous Chemical Control Division has ongoing responsibility for maintenance of the pesticide plan. Training of applicators is conducted by the Cooperative Extension Service of the District of Columbia. The Department of Economic Development assists the lead agency in the administration of the pesticide applicator permit program.

Figure 1

DEPARTMENT OF ENVIRONMENTAL SERVICES

ORGANIZATIONAL CHART


Director
Office of Career Development and Training
Office of Community Beautification
Office of Environmental Planning and Management
Office of Executive Management
Office of Special Services
Engineering and Construction Administration
Environmental Health Administration
Water Resources Management Administration
Solid Waste Management Administration

Pollution Control and Abatement Programs

I. AIR

A. Introduction

The District of Columbia portion of the National Capital Interstate Air Quality Control Region (AQCR) has been determined by the Region III Administrator for EPA to be in violation of National Ambient Air Quality Standards for carbon monoxide, photochemical oxidants and for total suspended particulates. The existing State Implementation Plan has been determined to be substantially inadequate to assure that the air quality standards will be attained and maintained by the statutory deadline in 1977. The States of Virginia and Maryland also have been served notice that their portions of the National Capital Interstate AQCR are in violation of the standards for both carbon monoxide and photochemical oxidants, and that their portions of the State Implementation Plans will have to be revised. The State Implementation Plan for the District of Columbia's portion of the National Capital AQCR has been approved for New Source Review, emission limitations, and transportation measures have been promulgated.

The District of Columbia has thirty-five major installations capable of emitting over 100 tons of a pollutant each year, according to "Formal Reporting System-State Activity Report" (June 30, 1976) released by the EPA Office of Planning and Management's Program Reporting Division. Twenty-six of these facilities are in compliance with respect to emission limitations and compliance schedules and nine are in violation.

The Department of Environmental Services' Environmental Health Administration has overall coordinating authority for the implementation of the State Implementation Plan for the National Capital AQCR, including suburban Virginia and Maryland. The Bureau of Air and Water Quality Control reviews and develops plans for the abatement and control of air pollution and has educational responsibilities to inform both industry and the general public of the Bureau's air pollution programs.

B. Workforce Profile

The Bureau of Air and Water Quality Control currently employs a staff of twenty persons including the Bureau Chief in the Air Program section. The Bureau's mission is to improve the quality of both air and water in the District of Columbia and to attain the standards promulgated by EPA. The air program has a professional staff of four engineers with backgrounds in chemical and mechanical engineering. Of the three chemical engineers currently employed by the Bureau's Air Program, two have Bachelor's degrees with one specializing in fuel technology and the third has a Ph.D. in chemical engineering plus a Bachelor's degree in Chemistry. The engineer with a mechanical engineering background has a Masters in the field. The air program also has nine technicians and two chemists on its staff. Two clerical personnel have been assigned to the air program and two more are shared by the Bureau as a whole. Personnel are recruited through the Department of Environmental Service's Personnel

Department. The current staff of the Bureau of Air and Water Quality Control's Air program is as follows (only positions designated for the air program are included).

TABLE I

DISTRICT OF COLUMBIA

Bureau of Air and Water Quality Control
Air Quality Division
Current (1976) Staffing Level

Position	1976
Engineer	4
Chemist	2
Technician	9
Other	4
TOTAL	19

C. Workforce Projections

Workforce projections for staffing level increases for the Bureau's Air Quality Division are based on the professional judgements of the Bureau's administrators. The Bureau experiences an overall turnover rate averaging approximately 6 persons per year or 16 percent. The turnover is about equal for all positions except for the secretarial, which accounts for about one-half of the Bureau's total annual turnover rate. The principal reason for such a relatively high turnover rate is the fact that the Bureau's personnel can often obtain better positions with greater potential for advancement with the Federal government or private industry.

Since 1975, the Bureau has increased in staffing level by two positions. The professional staffing level has remained the same as one person has resigned and has been replaced. Both the secretarial and technician positions have increased by one person each in the last year. No growth is anticipated in the Bureau's Air Quality Division due to budgetary limitations imposed by the District government. However, the air program's staffing level is not expected to decline but will probably remain at the current level, according to program administrators.

D. Training and Certification

Each new entrant employed by the Bureau of Air and Water Quality Control is trained individually through on-the-job training. Insufficient time and funding prevent undertaking a formal training program. Bureau personnel are available to conduct special programs and lectures to train new personnel on an informal in-house basis. Visual aids and pamphlets are also available on either a give-away or a loan basis.

Another form of training available to Air Quality Division personnel is through the Environmental Health Administration's policy of rotation of personnel to other Divisions. This program enables each person to become knowledgeable about the problems and programs of other environmental areas.

Most of the formal training for personnel of the Air Quality Division is received from the EPA Air Pollution Training Institute.

The Environmental Protection Agency provided a training grant to the Bureau's air program to enable it to participate in EPA training, but the Institute's tuition fees may result in less frequent participation by the air program's personnel. According to data supplied by the Air Pollution Training Institute, the District of Columbia sent a total of eighteen students to the Institute courses during FY 1976. However, the Air Quality Division only sent one student and the Department of Public Health and Welfare sent five during that year.

Air pollution courses are offered by Howard University's Engineering program and leads, as a part of its engineering program, to an Associate of Arts, Bachelor of Science, Master of Engineering, and Master of Science degrees.

E. Career Potential

According to Bureau of Air and Water Quality administrative officials, air pollution control career opportunities are expected to be created with the advent of advanced control process technology. Program officials expect these careers to be at the technical and semi-professional levels rather than in the engineering and advanced degree levels. Industries will need personnel to maintain this advanced control process technology in proper operating condition, and they will need technician-level personnel who can determine whether or not the industry is in compliance with ambient air quality standards.

Program administrators do not expect much career potential for employment with the Air Quality Division over the next five years because of budgetary constraints. However, if additional funds were made available through federal initiatives, e.g., Amendments to the Clean Air Act, additional positions for engineers, chemists and technicians would become available within the Bureau's Air Quality Division.

F. Conclusion

The Bureau of Air and Water Quality Control's Air Quality Division is staffed with chemists and civil, mechanical, and chemical engineers. It is anticipated that career opportunities within both the public and private sectors will develop for technicians as a consequence of changing technology.

Training for air pollution control program personnel is on-the-job as insufficient funding and personnel are available to conduct a formal training program. Personnel have attended EPA training courses offered by the Air Pollution Training Institute, but tuition fees will compel the Bureau to utilize this training resource less frequently in the future.

II. NOISE

A. Introduction

Noise pollution control and abatement activities in the District of Columbia are the principal responsibility of the Bureau of Occupational and Institutional Hygiene, a part of the Department of Environmental Services' Environmental Health Administration. The Bureau responds to citizen and industrial complaints regarding excessive levels of noise pollution. The District of Columbia has pending noise legislation before the District government which sets specific limits on community noise levels and has enforceable acoustical criteria. In the Washington area, the District of Columbia is the last major municipality to enact comprehensive noise legislation. Montgomery County, Arlington and Alexandria have all enacted noise legislation in 1975-1976. The Bureau receives advice concerning the District's noise pollution control program from a noise technical committee in the D.C. Council of Governments.

B. Workforce Profile

Two industrial hygienists from the Bureau of Occupational and Institutional Hygiene and two temporary transfers from the Health Inspection office constitute the total workforce in the District of Columbia which perform noise monitoring work. These four part-time persons conduct surveys and inspections using instruments such as noise meters and metrosonic dB sound level meter as well as monitoring noise levels whenever requested by concerned citizens or industrial groups.

These four persons are responsible for performing the technical monitoring work necessary for the enforcement of three municipal noise ordinance regulations. The District of Columbia has zoning and vehicle ordinances which include acoustical criteria and a nuisance regulation which does not include such criteria and which are part of the District of Columbia's Environmental Code. The District of Columbia Police Department has enforcement powers over these noise ordinances and such authority is located under the D.C. Police Regulations, Section 3.1, Article 6. They deal with noise as a result of loud noises in public places, traffic and motor vehicles noise and zoning. Also under Section 3, Article 6, noise levels are set at 75 dB one meter from the amplifier source. Other noise limits are regulation on the basis of time constraints such as not allowing construction activity between 7 PM and 7 AM. Sound level monitoring readings are also taken at the property line at construction projects. The noise control staff further provide technical support to the Police Department if complaints are received. They perform the sound level measurements and recommend to the Police Department whether or not the generator of the noise is in violation of the regulations.

C. Workforce Projections

Workforce Projections for noise pollution control personnel in the District of Columbia are based on the professional judgement of personnel of the Bureau of Occupational and Institutional Hygiene. Additional personnel for noise control activities in the District of

Columbia depends on whether or not the proposed legislation is enacted and budgetary support is provided. Sources in the field estimate that an additional eight personnel will be needed to satisfy the provisions of the proposed legislation. Sources in the field project that an electrical engineer will be needed to repair and maintain the Division's sound monitoring equipment, to keep abreast of the changing technology and to recommend what additional equipment should be obtained. One person will be needed for planning and this person will have an urban planning background. The Division intends to propose a study for traffic noise problems in the District of Columbia by analyzing traffic patterns. Six additional technicians with associate-level degrees will also be required to perform the monitoring tasks required by the new noise legislation.

The new legislation will provide the division with enforcement powers and will be more specific than any legislation previously enacted. For example, decibel limits will be set at 55 decibels for communities at the property line and 65 decibels at the property line in areas of construction activity.

D. Training and Certification

Staff personnel do not receive formal training in-house; the available training is informal on-the-job. One person recently attended a seminar sponsored in Wichita, Kansas sponsored by the National Institute of Occupational Safety and Health. Personnel from the

Occupational Safety and Health Administration (OSHA) conducted the lectures which dealt with topics concerning the OSHA regulations. Attendees were taken on field trips to learn how industrial plants were coping with the OSHA regulations requiring protection of workers from hazardous noise levels.

E. Career Potential

If the new noise legislation is enacted by the District government, the career potential for positions in the field of noise control will dramatically improve. Sources in the field anticipate that the career potential for Industrial Hygienists in the noise pollution control and abatement field will improve as health problems related to factory noise pose serious health problems and are beginning to be recognized.

The career potential for environmental noise control positions with the District government is anticipated to improve for electrical engineering personnel, urban planners and noise monitoring technicians.

F. Conclusion

The Bureau of Occupational and Institutional Hygiene presently lacks both enforcement powers and personnel necessary to perform noise monitoring tasks of a regulatory nature. Enforcement authority is the responsibility of the District of Columbia Police Department. If proposed legislation pending before the District government is enacted,

the Bureau will acquire both enforcement powers and more personnel to fulfill enlarged responsibilities. The Bureau has all the instrumentation necessary to monitor noise levels in the District but lacks the personnel to conduct the tests.

III. PESTICIDES

A. Introduction

The U.S. Environmental Protection Agency has designated the District of Columbia's Department of Environmental Services as the lead agency for the administration of the pesticide certification program, which includes enforcement responsibilities. The Environmental Health Administration, a part of the Department of Environmental Services, has the basic responsibility for the implementation of the District's State Plan for the Certification of Commercial and Private Applicators of Restricted-Use Pesticides.

The Department has proposed legislation before the City Council to provide enabling authority to comply with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The proposed legislation is entitled the Pesticide Operations Act. On passage of the Act, the Mayor will be empowered to create a Pesticide Advisory Board to advise the Department of Environmental Services on matters relating to the use and application of pesticides.

The Department of Economic Development, under the State Plan, is to be involved with the issuance, denial, suspension or revocation of licenses on authorization from the lead agency. The Solid Waste Management Administration will assist the Department of Environmental Services in the development of standards to regulate the storage and disposal of pesticide containers and pesticides. The Cooperative Extension Services of the District of Columbia is a participant in training activities and administers certification examinations.

B. Workforce Profile

The Director of the Department of Environmental Services has overall supervisory responsibilities for the implementation of the State Plan. This involvement includes preparing and recommending to the Mayor environmental criteria standards, rules, regulations, and plans for enforcement activities concerning pesticides regulations.

The Department's Environmental Health Administration has four individuals with involvement in the certification of applicators program. These persons include:

1) The Director of the Environmental Health Administration - Responsible to the Director of the Department for all phases of the pesticide regulatory program.

2) The Chief of the Bureau of Consumer Health Inspection Services - Responsible to the Administration's Director for the administration, planning, direction and coordination of the pesticide program.

3) The Chief of the Hazardous Chemical Control Division - Responsible to the Chief of the Bureau of Health Inspection Services for the direction and operation of the Division to regulate the sale, distribution, registration and application of pesticides. Responsible for routine enforcement activities related to pesticide dealers and private as well as commercial certified applicators.

4) War on Rats Program-Vector Control Specialist - Responsible for providing assistance to the Department in the development of the State plan; regulations and standards.

The Director of the Department of Economic Development is responsible for the Department's activities in the certification program. This activity includes the issuance, denial, suspension and revocation of permits or licenses if the director of the lead agency so recommends.

The Washington Cooperative Extension Services has a total of four individuals with involvement in the implementation of the State Plan. This involvement includes the following individuals:

1) Director of Cooperative Extension Service - Provides overall coordinating authority for Extension Services activities.

2) Associate Director of Cooperative Extension Service - Responsible for coordinating various programs within the Department.

3) Program Director of Extension Horticulture - Provides supervision and leadership to Extension staff and coordinates and develops program plans within the Department.

4) Training Coordinator - Responsible for developing a pesticide applicator training manual, pilot testing programs, training of pesticide applicators and their retraining to assure continued competence.

District officials estimate that 302 commercial and 20 private applicators require certification under the provisions required by the State Plan. According to documentation prepared by the Regional Support Branch, Operations Division of the Office of Pesticides Programs, and based on first quarter FY 1977 State Cooperative Extension Service reports, 256 commercial applicators have received training in all categories and 300 remain to be trained. About 160 private applicators have received training in all categories and 200 remain to be trained. It is important to emphasize that these totals represent examinations taken by applicators in all categories and many applicators receive certification in more than one category.

The following depicts the estimated number of commercial applicators by category that are expected to be certified within the District of Columbia.

TABLE II

DISTRICT OF COLUMBIA

Projected Applicator Certification

Category	Number
Ornamental and Turf Pest Control	
Ornamental Plant and Shade Tree	9
Turf and Lawn Pest Control	9
Industrial, Institutional, Structural and Health Related Pest Control	
General Pest Control	100
Wood Destroying Organisms	75
Bird Control	10
Fumigation	3
Rodent Control	75
Industrial Weed Control	5
Right-Of-Way	4
Public Health Pest	2
Aquatic	4
Regulatory	2
Demonstration and Research	4
TOTAL	302

District officials do not feel that there is a need for certification in the following categories: Agricultural Pest Control, Forest Pest Control, and Seed Treatment.

The Hazardous Chemical Control Division has four people involved in the certification and enforcement program. This includes one full-time division chief, a half-time secretary and two persons hired through an EPA grant. The two persons recently hired include

an entomologist with a Master's degree and an experienced applicator for the training effort. The Division will conduct product samplings, regulate use, provide for label registration, and record pesticide dealers. Division officials estimate that 130 federal applicators will require certification under the program.

The total estimated pesticide and pest control workforce is depicted in the following table, in which figures are approximations of the workforce engaged in pesticide activities on either a full or part-time basis.

TABLE III

DISTRICT OF COLUMBIA

Current (1976) Pesticide Workforce Staffing Levels (est.)
Public and Private Sectors

Public Sector Position	1976
Department of Environmental Services	1
Environmental Health Administration	7
Dept. of Economic Development	1
Washington Cooperative Ext. Service	4
Federal Applicators	130
TOTAL	143
Private Sector Position	
Commercial Applicators	302
Private Applicators	20
TOTAL	322

C. Workforce Projections

Information concerning workforce projections for the pesticides regulatory program was collected through on-site and telephone inter-

views with pesticide professionals in the Bureau of Consumer Health Services. Bureau officials anticipate that the Hazardous Chemical Control Division will recruit four additional consumer safety officers with a background in pesticides usage, to monitor all licenses, to examine pesticide use and sale records, to inspect equipment and storage areas, to enforce safety standards and to control operational procedures. These consumer safety officers are to provide full-time inspection capabilities to the Division to regulate pesticide dealers who sell restricted-use pesticides and commercial and private applicators. However, enforcement capabilities are to be placed on the dealers since there is only a limited inspection capability.

The training program conducted by the Extension Service is to be maintained as it is required under the State Plan, e.g., commercial applicators must renew their licenses annually and private applicators must renew them tri-annually. Information concerning possible growth in the numbers of commercial and private applicators over the next five year period is currently not available.

D. Training and Certification

Although the applicator training is formally the overall responsibility of the Cooperative Extension Services of the District of Columbia, the actual training is being conducted by the Washington Technical Institute. The Cooperative Extension Service does not possess any responsibility for scoring, evaluating or judging appli-

cator competency; nor are they involved with the actual certification procedures. Certification functions are the responsibility of the lead agency (The Department of Environmental Services).

The Department of Environmental Services and the Department of Economic Development jointly review applications for certification and licensing to assure that commercial and private applicators meet established requirements. In addition to a written examination, commercial applicators are required to pass a practical examination which consists of any tests or determinations prescribed by the Mayor, e.g., pest identification and signs of pest damage. When qualified, both commercial and private applicators are to be issued a license and a certificate. In addition, the Department of Environmental Services is to issue a wallet-sized identification card which is to be presented to pesticide dealers at the time of purchase. Private applicators will be authorized to purchase only specific brand-name products or similar products having the same active ingredient formulation for which the private applicator has demonstrated competency.

Training materials for both private and commercial applicators are based upon EPA and North East Core Manuals and such other training materials that may be developed by the Cooperative Extension Service. After the initial training and certification is completed, which assures compliance with FIFRA and its October 21, 1977, deadline, continued training is to be conducted on a scheduled basis only as the needs indicate. The re-certification process may include re-examinations or the presentation of documentation indicating that

the applicators have satisfactorily completed educational courses, programs, seminars, or workshops.

Information concerning training participated in by the District's pesticide program regulatory personnel is not currently available because the program has only recently been established.

E. Career Potential

Due to the recency of the District of Columbia's regulatory program, it is difficult to identify new careers which may be emerging as a consequence of the proposed new regulatory legislation or because of changing technology. However, it is anticipated that there will be growth in the numbers of applicators applying structural pesticides in both the public and private sectors.

F. Conclusion

Implementation of a program to train and certify commercial and private applicators in the District of Columbia is recent. District officials estimate that $80,000 annually will be needed to conduct a minimum program. The new Pesticide Operations Act is considered to be more restrictive than what is generally required by FIFRA. For example, the District Act requires that all persons deriving income from pest control work must be certified or have someone in their employ who is certified, regardless of the classification of the pesticides used. Also, all state and governmental agencies are to have a certified applicator in their employ if that agency engages in any pest control activities. Property owners or their employees

who use restricted-use pesticides on property occupied by any tenant or lessee must obtain a pesticide operators license which requires such persons to be certified and licensed in all appropriate categories.

Several governmental agencies of the District of Columbia are involved in the pesticides applicator training and certification program which is outlined in the District's State Plan. The Department of Environmental Services has the administering authority as the lead Agency for the implementation of the Plan. The Hazardous Chemical Control Division under the Department's Bureau of Consumer Health Services, has implementation authority to regulate the use and application of pesticides. The Department of Economic Development, upon the recommendation of the Lead Agency, has authority to issue, deny, suspend or revoke licenses of pesticide applicators, wholesalers, distributors and retailers. Finally, the Cooperative Extension Services of the District of Columbia participates in training activities and administering examinations.

An additional four consumer safety officers are projected to be recruited by 1982 to provide an inspection capability to the Hazardous and Chemical Control Division to regulate the use and application of pesticides. It is not anticipated that these persons will require a great deal of formalized training since the persons actually recruited will need only a background in pesticide usage.

Finally provision in the State Plan provides for commercial and private applicators to obtain re-certification. Commercial applica-

tors must renew their licenses annually and private applicators must renew theirs tri-annually. Provisions in the re-certification process have been made in the state plan to allow for presentation of documentation which indicates that the applicators have satisfactorily completed educational courses, programs, seminars or workshops.

IV. POTABLE WATER

A. Introduction

One water system, operated by the Corps of Engineers and known as the Washington Aqueduct, serves all of the District of Columbia, Arlington County and Falls Church, in Northern Virginia. This facility serves about one-half of the population of the Washington metropolitan area's three million persons. This aqueduct system draws its water supplies from the Potomac River. It is estimated that two small aqueduct reservoirs in the District of Columbia, Dalecarlia and McMillan, have enough total reserve capacity to last one day. Only in Washington D.C. does the Corps of Engineers have the job of supplying water.

The Army Corps of Engineers is preparing plans for a pilot water treatment plant close to the Blue Plains sewage treatment plant. The purpose of the pilot plant will be to determine whether or not water from the Potomac's Tidal Estuary can be made safe to drink. The results from the pilot treatment plant's operation are to be studied by the National Academy of Sciences. It is expected that construction, operations and study of the facility will be continued into the early 1980's. The Corps is also currently constructing a pump to bring water from the Upper Potomac Tidal Estuary to the Washington Aqueduct's water treatment plant. The construction of the pumping station is scheduled to be completed in mid-1978 and is

to be used only if there is a major water supply emergency. District officials assert that the Washington area's drinking water supply is undependable and that there is a real possibility that summer water shortages and rationing could take place.

Water supply program activities are the responsibility of the Department of Environmental Services. This Department has two agencies, the Environmental Health Administration and the Water Resources Management Administration, with program responsibilities. The Environmental Health Administration's Bureau of Air and Water Quality Control enforces District regulations, and the Water Resources Management Administration maintains distribution systems, water meters, and has other water supply functions. The actual operation of the Washington Aqueduct water treatment plant is the Corps' responsibility. The Department of Human Resource's distribution system laboratory analyzes distribution system samples which are collected.

The District of Columbia's Department of Environmental Services has expressed an intent to EPA to assume primacy over the Federal Safe Drinking Water Act. Additional engineers, chemists, bacteriologists, and technicians will be recruited by the Bureau of Air and Water Quality Control to enforce the federal Act.

B. Workforce Profile

The Bureau of Air and Water Quality Control has the following functions:

1) Plans Review and Development;

2) Review and revision of current regulations and makes recommendations for the development of new rules and regulations;

3) Enforces existing regulations; and

4) Provides educational programs to both industry and the general public.

Including the Chief of the Bureau and the Division of Water Hygiene Control, the Bureau is currently staffed with a total of five persons. Table IV provides a breakdown of positions in the Bureau staff.

TABLE IV

DISTRICT OF COLUMBIA

Bureau of Air and Water Quality Control
Current (1976) Staffing Level

Position	1976
Engineer	3
Technician	1
Other	1
TOTAL	5

The engineers hold the positions of Civil Engineer and Sanitary Engineers. The Bureau Chief is a civil engineer and the Division Chief is a sanitary engineer. The technician is an environmental health technician who has the responsibility of collecting water distribution system samples.

The Water Resources Management Administration's Water Services Division is staffed with a total of 181 filled positions with eight vacancies. The distribution of personnel is depicted below.

TABLE V

DISTRICT OF COLUMBIA

Water Resources Management Administration
Water Services Division
Current (1976) Staffing Level

Position	1976
Engineer *	4
Technician **	1
Consumer Service Representative	12
Foreman	13
Meter Tester Leader	1
Meter Installer	30
Water Services Worker	65
Engineering Equipment Operator	3
Meter Repairer and Tester	3
Tapping Machine Operator	3
Crane Operator	1
Meter Repairer	2
General Equipment Repairman	1
Compressor Operator Truck Driver	2
Motor Vehicle Operator	4
Plumber	1
Meter and Gear Train Operator	1
Meter Installer Helper	8
Meter Shop Helper	2
Laborer	22
Administrators	2
TOTAL	181

* Includes two civil and two mechanical engineers
** Includes one hydraulic engineering technician

The Bureau of Air and Water Quality Control recruits through the Personnel Department. Personnel employed by the Bureau have U.S.

General Service Administration job ratings. Water Resources Management Administration personnel are also recruited through the Personnel Department.

C. Workforce Projections

Workforce Projections for Water Supply Program activities are based on the professional estimates of administrators of the Bureau of Air and Water Quality Control. These officials project additional chemists, engineers, technicians, and bacteriologists will be needed for implementation of primary enforcement responsibilities for the Federal Safe Drinking Water Act. By 1978, the Bureau anticipates recruiting for water supply program activities one engineer and two technicians. Specific projections beyond that were unavailable.

Administrative officials of the Water Resources Management Administration do not anticipate hiring additional personnel as the Department of Environmental Services has reduced its staff by 800 positions over the last three years by phasing out vacancies. Therefore, it is unlikely that significant numbers of new employees will be hired by 1982 as this attrition process is expected to continue.

The Bureau of Air and Water Quality Control experiences an average annual turnover rate of about sixteen percent or approximately six positions. The turnover rate is about equal for all positions except secretarial, which accounts for one-half of the Bureau's total turnover rate. The principal reason for such a

relatively high turnover rate is that staff are often able to find higher paying positions with greater advancement possibilities in the private sector.

D. Training and Certification

Bureau personnel within the Environmental Health Administration receive training on-the-job. However, individual attention is given to the new entrant's training needs although no formal training program is offered. It is not likely that the Bureau will initiate a formal training program for staff because of personnel and budgetory constraints.

Staff do conduct lectures and provide some visual aids such as films and pamphlets to the general public, however. This information is provided on either a loan or a give-away basis. Specific totals for water supply and wastewater pollution control personnel attaining EPA National Training Center Courses at Cincinnati during Fiscal Year, 1976, is available in the Wastewater Section of this District of Columbia report.

E. Career Potential

The District's intent to assume primacy over the Safe Drinking Water Act is likely to increase the career potential in the Water Supply Pollution Control and Abatement area in the next five years. As the technology currently being developed becomes more complex and advanced in central processes, additional technicians will be required

to operate and maintain such equipment. Career potential for jobs within the Bureau of Air and Water Quality Control appears best for engineers, chemists, bacteriologists and technicians.

F. Conclusion

Water Supply Program responsibilities are split among three organizations: the Environmental Health Administration (enforcement of regulations, collection of distribution samples); the Water Resources Management Administration (maintenance of water services and meters); and the Army Corps of Engineers (operation of the Washington Aqueduct Water Treatment Plants).

The impending assumption of primacy over the Federal Safe Drinking Water Act is projected to directly impact staff growth of the Bureau of Air and Water Quality Control. Career potential exists for chemists, engineers, bacteriologists and technicians with the Bureau.

Training for Department of Environmental Services personnel is mostly on-the-job although new entrants are provided with individual attention which is addressed to filling their training needs. It is clear, however, that additional training resources will be needed as the Department of Environmental Services assumes primary enforcement responsibilities over the Safe Drinking Water Act.

V. RADIATION

A. Introduction

Radiological health program activities were transferred recently from the Environmental Health Administration's Bureau of Institutional Hygiene and Radiological Health to a new Bureau of Occupational and Institutional Hygiene. The Environmental Health Administration is a part of the Department of Environmental Services. The Radiological Health Section is located under the Bureau's Division of Occupational Hygiene.

As a regulatory agency, the Radiological Health Section is responsible for the direct regulation of all sources of radiation, both ionizing and non-ionizing. The Radiological Health Section carries out the District's regulatory program for dental/medical and industrial X-ray devices and performs environmental radiation surveillance tasks as well. Annual inspections are conducted of users of radioactive materials at health care facilities by the Bureau's radiological health personnel. Food, milk, and air samples are also analyzed to test for levels of radioactivity that may be present. The District of Columbia is not under agreement status with the U.S. Nuclear Regulatory Commission (NRC) to inspect users of radioactive materials; thus, NRC still has the ultimate responsibility in this area. The City Council recently passed enabling legislation in March, 1976, to provide for the regulation of users of radioactive materials. This legislation paves the way for the District of Columbia to enter into an agreement with

the NRC. The Radiological health program has emergency planning responsibilities to deal with accidents involving the transport of radioactive materials.

B. Workforce Profile

The Radiological Health Section has a total staff of five persons with one position currently vacant. The staffing of the Radiological Health Section, by position, is depicted in Table VI.

TABLE VI

DISTRICT OF COLUMBIA DEPARTMENT OF ENVIRONMENTAL SERVICES

Bureau of Occupational and Institutional Health
Division of Occupational Hygiene
Radiological Health Section
Current (1976) Staffing Level

Position	1976
Health Physicist	2
Chemist	1
Other	2*
TOTAL	5

* Includes one vacant administrator position

The Bureau recruits personnel from colleges or from other governmental agencies with which they come in contact. Preference is given to hiring health physicists or other personnel with backgrounds in physics or radiological health. Additional consideration in recruitment is given to those with Master's degrees in these areas.

C. Workforce Projections

Workforce projections for additional radiological health personnel for the next five year period in the District of Columbia are based upon professional estimates of Radiological health activities over the next five year period because of budgetary constraints. The principal reason for projection of a no-growth situation is that the Department of Environmental Services has undergone a dramatic reduction in personnel over the last three years. This reduction in force is expected to continue through 1976 and then gradually stabilize. Therefore, it is evident to program administrators that additional personnel to fulfill current tasks are not likely to be forthcoming in the next five years.

The Bureau of Occupational and Institutional Hygiene is estimated by its administrative officials to experience an average annual turnover rate of about ten percent among its permanent positions. Turnover mainly results from professional staff recruitment by the private sector for administrative positions.

D. Training and Certification

Radiological Health Program staff professionals attend U.S. Nuclear Regulatory Commission (NRC) training courses whenever possible. NRC courses are utilized primarily because the training is free and the caliber of instruction is of high quality. NRC and Texas jointly

sponsored a course attended by District personnel entitled "Regulatory Aspects of the Use of Radioactive Materials for Gas and Oil Well Logging". Another NRC course attended by District radiological health personnel was offered by NRC at Oak Ridge, Tennessee. This ten-week course is designed to instruct personnel in health physics and in radiation protection techniques.

The Bureau currently lacks adequate funding to initiate an in-house training program or to hire staff to conduct courses. Generally, training programs offered by Federal agencies are participated in by the Bureau's radiological health program personnel whenever the courses do not charge registration fees and transportation costs are paid.

E. Career Potential

At the present time, it appears that careers in regulatory radiological health jobs in the District of Columbia government will remain limited throughout the next five years. However, if funding does become available, it is anticipated by program administrators that public health physicists with Master's degrees will be needed for inspection of radioactive materials activities.

F. Conclusion

The District of Columbia's radiological health program is continuing to develop as a result of passage of legislation by the City Council to provide authorization to inspect users of radioactive

materials. This signals an intent by the District government that it desires Agreement-State status with the Nuclear Regulatory Commission to perform monitoring tasks. However, due to budget constraints, the radiological health program is likely to remain at its present staffing level.

The Radiological Health Section is hard pressed to provide training for its professional staff. Attendance at training programs sponsored by Federal Agencies such as the Nuclear Regulatory Commission, constitutes the bulk of the training received by the program's staff.

Career potential for jobs in the radiological health field are likely to remain limited in District government. There are no nuclear power plants in the area, so there is not likely to be a demand for health physicists or radiation safety officers in the nuclear power generating industry.

VI. SOLID WASTE

A. Introduction

In the District of Columbia, solid waste disposal is accomplished through the use of an incinerator and a sanitary landfill. The incinerator is a $23 million facility located in the northeastern quarter of the District of Columbia. This plant, which was opened in 1972, is capable of burning 1,250 tons of refuse a day. Officials estimate that the plant requires a staff of 95 persons to operate the plant on a 24-hour-a-day, five-days-a-week basis.

In addition to the incinerator plant, the District hauls about 1,000 tons of refuse per day to a sanitary landfill in Lorton, Virginia. Residues from the incinerator are currently being dumped in the sanitary landfill, but ways are being explored by the Department of Environmental Services to find uses for the material. Talks between the Department of Environmental Services and the Potomac Electric Power Company (PEPCO) have been conducted to determine whether or not the incinerator can be converted into a steam producing plant. If the plant can be satisfactorily converted, the steam could be sold to PEPCO, which has a generating plant located beside the incinerator.

The District of Columbia's Solid Waste Management Program is the responsibility of the Department of Environmental Service's Solid Waste Management Administration. Statutory authority for the operation of this program is provided for by the District of

Columbia Solid Waste Law (District of Columbia Code, Annotated, 1967 Edition, Title 6, Health and Safety, Chapter 5, Garbage).

B. Workforce Profile

The Solid Waste Management Administration is composed of a collection program, a disposal program, and a facility maintenance and support program. The Administration currently operates with a total staff of 1,151 persons. There are a total of 916 persons in the Administration's collection force; 232 persons with disposal responsibilities at the incinerator, the sanitary landfill and at a transfer station; and three persons providing overall administration and support. The Solid Waste Management Administration has two bureaus and administrative support units which are:

1) Bureau of Solid Waste Collection (includes street cleaning)
2) Bureau of Solid Waste Disposal
3) Administration

The District of Columbia has 916 persons assigned to the Administration's Bureau of Solid Waste Collection. This total includes sanitation workers, motor vehicle operators, management, technical and clerical support personnel. Approximately 190 refuse trucks a day transport refuse to the District's incinerator and over 1,000 tons are transported to the sanitary landfill. Table VII depicts the current workforce distribution of personnel within the Bureau of Solid Waste Collection.

Table VIII depicts the total workforce of the Bureau of Solid Waste Disposal which includes the incinerator, the sanitary landfill and the transfer station. In addition to the personnel shown in

Table VIII, the Solid Waste Management Administration has two administrators and one clerical staff person to provide overall administrative coordination to the Administration.

TABLE VII

DISTRICT OF COLUMBIA DEPARTMENT OF ENVIRONMENTAL SERVICES

Solid Waste Management Administration
Bureau of Solid Waste Collection
Current (1976) Staffing Level

Position	1976
Administrator	4
Technician	36
Sanitation Worker	749
Clerical	14
Motor Vehicle Operator	113
TOTAL	916

TABLE VIII

DISTRICT OF COLUMBIA DEPARTMENT OF ENVIRONMENTAL SERVICES

Solid Waste Management Administration
Bureau of Solid Waste Disposal
Current (1976) Staffing Level

Position	1976
Administrator	2
Landfill/Incinerator Operator	29
Engineer	13
Technician	27
Motor Vehicle Operator	60
Sanitation Worker	14
Mechanic	25
Clerical	8
Other	54
TOTAL	232

In summary, according to information provided by Solid Waste Management personnel, it is estimated that 1,151 persons are employed in Solid Waste Management positions in the District of Columbia. This figures excludes information regarding total numbers in solid waste collection employed by the private sector for which information is currently not available.

C. Workforce Projections

Workforce projections for Solid Waste Management program Activities in the District of Columbia are based on professional judgements of the Administrations officials. Program officials do not anticipate future workforce increases for the Solid Waste Management Administration as the City Council has determined that future budgets must include personnel cutbacks.

Department officials foresee the only possible workforce increase in the area of solid waste management in the next five years to be a consequence of resource recovery operations. Specific estimations of projected workforce needs were not available because most resource recovery operations are still in the planning stages. For example, the District's incinerator could become a steam producing plant and residue produced through a thermal reduction process could be used as an aggregate in asphalt to pave city streets.

At the present time, information is not available concerning the possible impact on the solid waste management workforce of the new Federal Resource Conservation and Recovery Act. It is likely,

however, that additional chemical engineers will be recruited to handle the District's hazardous waste materials. Another possible alternative would be for the District to contract with other states on a regional basis to consolidate hazardous wastes using a manifest system to bring such materials to a regional disposal site.

D. Training and Certification

Most training offered for new entrants and staff of the Solid Waste Management Administration is on-the-job and informal in nature. Training for staff is provided on a needs basis whenever critical needs develop. This training usually teaches staff how to operate new equipment.

E. Career Potential

It appears that future growth in the solid waste management workforce in the District of Columbia is dependent on initiatives taken to develop resource recovery operations. Future initiatives may be developed by Metropolitan Washington Council of Governments (COG) in pursuing a regional approach to resource recovery. COG has contracted with the National Center for Resource Recovery to conduct a feasibility study of a facility for the recovery of materials and the possibility of processing solid waste into a supplementary fuel. Again, the facility being studied is the District's incinerator plant.

Careers may also develop for personnel to manage and conduct research concerning hazardous waste materials as a result of the

Congress' passage of the Resource Conservation and Recovery Act. Additional careers in both the public and private sectors may develop for chemists and chemical engineers.

F. Conclusion

Budgetary and personnel cutbacks have dramatically impacted workforce levels of the Solid Waste Management Administration in the past three years and are expected to continue. Minimal growth for solid waste management personnel was projected for the next five years. The development of more efficient and complex technology may further reduce the number of persons needed for both collection and disposal tasks. The Solid Waste Management Administration does not offer a formal in-house training program for its staff, but one is needed as personnel need familiarization with complex machinery operation.

A certification program has not been implemented for landfill and incinerator operators because of budgetary constraints and the current state of the art. The future will probably require training for operators and a certification program would likely accompany training activities.

Career potential will develop for personnel who can operate resource recovery facilities once they are established. Feasibility studies are now being conducted to determine whether or not steam and residues produced from the District's incinerator could be used

for resource recovery purposes. Also, because of the recent passage of the Resource Conservation and Recovery Act, additional personnel may be recruited for hazardous waste management operations.

VII. WASTEWATER

A. Introduction

In the District of Columbia, water pollution control is governed by the Federal Water Pollution Control Law which is specifically applicable to the District. The Department of Environmental Services is the District's administering agency for the control of wastewater pollution. The Department's Bureau of Air and Water Quality Control and Water Resources Management Administration jointly administer portions of the District's wastewater pollution control program.

The Bureau of Air and Water Quality Control has the basic mission to improve the quality of air and water in the District and to maintain standards. This mission is accomplished through the following activities:

1) Plans review and development;

2) Review and revisions of current regulations and to make recommendations for new rules and regulations;

3) Enforcement of existing regulations; and

4) Develop an educational program to educate both industry and the general public.

The Bureau is a sub-component of the Department's Environmental Health Administration. The Division of Water Hygiene Control enforces District regulations and leaves the National Pollutant and Discharge Elimination System (NPDES) Permitting Process to the U.S. Environmental

Protection Agency (EPA). The Bureau's Division of Engineering Services provides assistance to EPA for the review of plans and technical specification required under the Construction Grants Program.

The District of Columbia has one wastewater treatment plant to serve its citizens. This Blue Plains Wastewater Treatment Plant is the responsibility of the Water Resources Management Administration which is also part of the Department of Environmental Services. The plant is currently undergoing construction to upgrade its treatment processes from a primary and secondary treatment facility (Phase II) to an advanced treatment plant. Plant personnel are part of the Administrations Bureau of Wastewater Treatment. It is anticipated that when this facility complete its construction phase in Fiscal Year 1978, that an additional two hundred persons will be needed to operate and maintain the plant. Construction activities are coordinated with the Administration's Bureau of Construction.

The Water Resources Management Administration also has a Bureau of Water and Sewage Services to maintain the water distribution and sewer services for the District's population. Generally, the administration is responsible for the District's Distribution Systems, treatment plants, sewer system, and facility maintenance.

B. Workforce Profile

The Division of Water Hygiene Control, under the Bureau of Air and Water Quality Control, is currently staffed with a total of ten persons who are involved in wastewater pollution control. This total

includes the Bureau Chief who is a civil engineer. It does not include two secretaries who are shared within the Bureau, or an engineer and a technician who are assigned to general plans review tasks for the District of Columbia. The present staffing level of the Division of Water Hygiene Control is as follows.

TABLE IX

DISTRICT OF COLUMBIA DEPARTMENT OF ENVIRONMENTAL SERVICES

Bureau of Air and Water Quality Control
Division of Water Hygiene Control
Current (1976) Staffing Level

Position	1976
Engineer	2
Technician	5
Other *	3
TOTAL	10

*Includes one administrative and two clerical positions.

A sanitary and a civil engineer are assigned to water pollution control (wastewater) tasks by the Division of Water Hygiene Control. Environmental health technicians collect samples, conduct surveys, and have a variety of other duties. The Division currently has three vacant positions which include a supervisory sanitary engineer, a sanitary engineer and a technician.

The Division of Water Hygiene Control monitors industry effluents and is the certifying authority before permits are issued. Enforcement of District water quality regulations is the Division's principal mission. If industry sources are not in compliance, EPA has enforcement authority.

Recruitment of personnel for the Division is handled through the Personnel Department. Employees are under the Federal Civil Service System. Water samples collected by Division personnel are analyzed by the Blue Plains Laboratory. This Laboratory is certified by EPA. The Blue Plains Wastewater Treatment Plant is staffed by personnel of the Water Resources Management Administration which is also a part of the Department of Environmental Services. Blue Plains Plant personnel are a part of the Administration's Bureau of Wastewater Treatment. The Bureau currently has a total of 156 persons staffing the Blue Plains Wastewater Treatment Plant which serves all of the District of Columbia's residents. This total does not include fourteen currently vacant positions.

The Blue Plains Plant is currently being upgraded through construction and modification to an advanced facility. Difficulties are experienced by its personnel in handling sewage sludge. It is being upgraded to an advanced waste treatment facility with a capacity of 309 million gallons per day. The District's Blue Plains Wastewater Treatment Plant is staffed with the following personnel of the Administration's Bureau of Wastewater Treatment, and these positions are depicted in the following table which does not include vacant positions.

TABLE X

DISTRICT OF COLUMBIA DEPARTMENT OF ENVIRONMENTAL SERVICES

Water Resources Management Administration
Bureau of Wastewater Treatment
Current (1976) Staffing Level

Position	1976
Engineer	9
Chemist	7
Technician	4
Plant Grounds Foreman	4
Plant Foreman	16
Plant Operator Leader	16
Plant Operator	94
Plant Operator Trainee	2
Other	4
TOTAL	156

Of the nine engineering positions depicted in Table X, five are supervisory sanitary engineers, three are sanitary engineers and one is a mechanical engineer. The seven chemist positions are filled by a supervisory chemist, a research chemist and five chemists. One supervisory engineering technician and three physical science technicians compose the technician positions.

To maintain the District's sewer system, the Water Resources Management Administration has a Division of Sewer Services under its Bureau of Water and Sewer Services. Not including twelve vacancies, the Division of Sewer Services is staffed with a total of 125 positions which are shown in Table XI on the following page.

TABLE XI

DISTRICT OF COLUMBIA WATER RESOURCES MANAGEMENT ADMINISTRATION

Bureau of Water and Sewage Services
Division of Sewer Services
Current (1976) Staffing Level

Position	1976
Engineer *	2
Engineering Technician	2
Foreman	9
Leader	1
Workers Leader	7
Worker	53
Crane Operator	5
Engineering Equipment Operator	1
Mason	7
Masonry Worker	3
Mason Helper	2
Garage Traps Inspector	1
Utilities Maintenance Inspector and TV Equipment Operator	1
Motor Vehicle Operator	19
Utilities Maintenance Worker	3
Laborer	6
Clerical	3
TOTAL	125

* A Supervisory Civil Engineer and a Sanitary Engineer are included in the engineering position total.

Support for both of the preceding Water Resources Management Administration Divisions provided by personnel of the Administration's Office of Planning and Research and Administration Group. The Office of Planning and Research is staffed with the personnel shown in Table XII to provide support for both the waste water and water distribution systems.

TABLE XII

DISTRICT OF COLUMBIA

Water Resources Management Administration
Office of Planning and Research
Current (1976) Staffing Level

Position	1976
Engineer *	3
Chemist	2
Technician **	6
Aide ***	3
Mechanic	2
Sewage Disposal Plant Operator	1
Laborer	2
Maintenance Worker	1
TOTAL	20

* One Supervisory Civil Engineer, two Industrial Engineers.
** One Supervisory Engineering Technician, one Engineering technician, four physical science technicians.
*** Three Physical science aides.

Administration of the Water Resources Management Administration is provided by a director, a supervisory civil engineer, an administrative consultant, and an employee counselor.

The District of Columbia currently does not have a certification program for its Wastewater Treatment Plant Operators. Refer to the Training and Certification Section of this Wastewater report for the District of Columbia for further information regarding training and certification activities.

C. Workforce Projections

Workforce projections are based on the best professional judgements of personnel of both the Environmental Health Administration's Bureau of Air and Water Quality Control and the Water Resources Management Administration.

According to officials of the Department of Environmental Services Personnel Division, the entire Department has lost about 800 positions or one-fourth of its total workforce over the last three years. Department officials further assert that they expect to lose another 170 positions during 1976.

The only wastewater program agency expecting growth over the next five years is the Blue Plains Wastewater Treatment Plant. The Water Resources Management Administration's Bureau of Wastewater Treatment expects to recruit an additional two hundred positions for operation of the District's wastewater treatment plant. The treatment facility is currently undergoing construction to upgrade its treatment capabilities to become an advanced waste treatment facility by Fiscal Year 1980. Program administrators were unable to furnish specific numbers of persons needed to be recruited to staff the greatly improved facility after that date.

The Bureau of Air and Water Quality Control experiences an average annual turnover rate of about 16 percent or approximately six positions. The turnover rate is about equal for all positions except secretarial, which accounts for one-half of the Bureau's total turnover rate. The principal reasons for such a high turnover rate

is that the Bureau's personnel are often able to obtain better positions and opportunities for advancement. Bureau administrative officials project that their staffing level will remain relatively constant because of budgetary limitations. It is evident that wastewater pollution control personnel staffing within the Bureau's Division of Water Hygiene is projected to remain at the current level through 1982.

D. Training and Certification

Each new entrant hired by the Bureau of Air and Water Quality Control is trained individually through training of an on-the-job nature. No formal training program is offered for Bureau personnel as insufficient funding for personnel is available to conduct such a program. Bureau personnel are usually available to conduct special programs or lectures for staff. The Bureau also has some visual aids such as films and pamphlets available to either loan out or give away. Administrators of the Bureau do not envision initiating a formal training program for staff within the next five years because of budgetary and personnel limitations. Officials believe that there probably is not as much emphasis on training technicians as engineers. Consequently, there are fewer formal training programs available at which technicians can obtain training in wastewater pollution control. The Bureau has recently been compelled to reduce its staff participation in water pollution control training courses offered by EPA at the National Training Center in Cincinnati because of tuition fees charged to participants.

Water Resources Management Administration administrators have requested a grant from EPA to initiate a training program for wastewater treatment personnel. Training is considered an urgent need of the Bureau of Wastewater Treatment as additional personnel will be recruited once the Blue Plains Wastewater Treatment Plant is upgraded to an advanced facility in Fiscal Year 1978. At present there is no certification requirement in the District of Columbia for wastewater treatment plant operators. Operators currently receive training through a two year on-the-job training program. The first year after recruitment is devoted to on-the-job training and the second to part-time class attendance. Officials stated that no one attended the program during Fiscal Year 1976, although twelve persons participated during the previous year. The Bureau will need to recruit and train operations and maintenance personnel to run the treatment plant prior to the time it is completed.

According to Fiscal Year 1976 totals of persons attending courses offered by the EPA National Training Center at Cincinnati, twenty-one students participated from the District of Columbia. The courses attended and the number of students participating in each course is depicted on the following page.

COURSE NUMBER AND NAME		NO. STUDENTS
120.4	Bacteriological Tests for Permits Compliance	3
164.1	Self-Monitoring Procedures: Basic Parameters for Municipal Effluents	3
161.1	Stream Survey and Monitoring: Procedures for Field and Laboratory	3
162.2	Biological Treatment Technology	3
164.3	Self-Monitoring Procedures	3
172.1	Physical Chemical Treatment Technology	3
208.1	Area-Wide Waste Management: Water Quality	3
	TOTAL	21

E. Career Potential

Bureau of Air and Water Quality Control officials anticipate that new jobs will be created in the water pollution control field as a consequence of the development of new advanced technology. Program officials believe that these new jobs will be in the technical and semi-technical professional levels rather than in the engineering or advanced degree levels. The career potential for careers in the Bureau will remain limited due to budgetary constraints.

Technicians are likely to find the best career potential in the District of Columbia for wastewater pollution control jobs with the Water Resources Management Administration over the next five year period. Careers will probably be the most plentiful after Fiscal Year 1978. When the treatment facility is scheduled to complete construction activities.

F. Conclusion

Wastewater pollution control program activities are divided among the Water Resources Management Administration and the Environmental Health Administration, both within the Department of Environmental Services. The principal difference between the functions of both agencies is that the Environmental Health Administration has authority over enforcement of District water quality standards, whereas the Water Resources Management Administration is responsible for the maintenance of both sewer services and waste treatment facilities.

Workforce increases are projected for the Blue Plains Wastewater Treatment Plant by District officials. About 200 additional personnel will probably be recruited in Fiscal Year 1979. This facility is currently under Phase II of construction and is to be upgraded to an advanced treatment facility.

Training received by both Administrations' staff is currently limited. Operators of the Bureau of Waste Water Treatment under the Water Resources Management Administration, receive on-the-job training lasting two years from the Department of Environmental Services. Department officials will require additional training assistance from EPA in order to fulfill training needs anticipated by the additional personnel expected to be recruited to operate and maintain the Blue Plains treatment plant facility over the next five year period.

VIII. ENERGY

The District of Columbia does not have an energy office at the present time.

Selected Post Secondary Institutions With Formal Environmental Energy Programs

George Washington University has a well developed environmental curriculum. Undergraduate degrees are available in Environmental Civil Engineering and Environmental Studies. Graduate programs are offered in Environmental Law; Environmental Civil Engineering; Energy, Resources, and Environment; Acoustics; Environmental Studies; Environmental Sciences; and Environmental Modeling. Selected programs offered through George Washington University are examined in detail in the section immediately following this narrative. The review includes information on the program course offerings, student enrollment and graduate statistics, and faculty level of effort.

The Continuing Education Program offered through George Washington University has also offered numerous environmentally related short courses and workshops. Among the continuing education programs which were offered between March and August of 1977 are the following:

1) Energy Conservation for Existing Buildings;
2) Integrated Utility Systems;
3) Electrical Controls and Protective Relays for Industrial and Commercial Power Systems;
4) Total Energy and Selective Energy Utility Systems;
5) Environmental Law;
6) Preparation of Environmental Impact Statements;
7) Solar Heating and Cooling;
8) Microwave Remote Sensing of Ocean and Atmosphere;
9) Heat Pipe Theory and Application.

The George Washington University School of Engineering and Applied Science offered a continuing education program entitled Exploring Energy Choices. This seminar was designed to provide engineers, scientists, managers, and others with a comprehensive understanding of current and future options and their impact upon energy policy. The focus of the seminar was on the discussion of energy policies, presenting the basic facts and conflicting opinions concerning shortages of resources, the effect on the environment, foreign policy, and the projected inflation of energy prices.

Other than the programs offered through George Washington University environmental career programs are rare in the colleges and universities located within the District of Columbia.

SENIOR INSTITUTIONS

George Washington University
Washington, D.C.

Program: Environmental Law (L.L.M., J.S.D.)

Hours required for major: Semester - (L.L.M.) 24 plus thesis, (J.S.D.) individually arranged
Program Inception: (L.L.M. and J.S.D.) 1970
Staff Size: One professor (J.D.), seven adjunct professors, and four guest lecturers
Enrollment: (L.L.M.) 27, (J.S.D.) 0
Graduates (1976): (L.L.M.) 12 (est.), (J.S.D.) 0
Placement: not available
Graduate Work: not available

Courses

Environmental Litigation
Clinical Studies in Environmental Law
Environmental Planning
Environmental Law
Research in Public Law
Public Policy and Mass Media
Government Procurement Law
Seminar: Science and the Legal Process
Use and Control of Nuclear Energy
Legal Protection against Technological Hazards
Land Development Law
Intergovernmental Relations I, II
International Law of the Sea
Taxation--State and Local
Land Development and Planning
Legislative Drafting

Program: Energy, Resource, and Environment (M.S., Professional Engineer, D.Sc.)

Hours required for major: Semester - (M.S.) 24 plus thesis, (Professional Engineer) 30, (D.Sc.) 30 plus qualifying examination and disseration
Program Inception: (M.S.) 1971, (Professional Engineer) 1975, (D.Sc.) 1971
Staff Size: Four professors, one associate professor (5 Ph.D.), and 15 adjunct professors.
Enrollment: (M.S.) 60, (Professional Engineer) 5, (D.Sc.) 15
Graduates (1976): (M.S.) 10, (Professional Engineer) 0, (D.Sc.) 1
Placement: not available
Graduate Work: not available

Courses

Analytical Methods in Engineering I, III, IV, V
Solid Waste Disposal
Environmental Impact Assessment
Electromagnetic Waves
Plasma Dynamics
Environmental Management
Technology and Human Needs
Engineering Climatology
Energy Conservation
Quantitative Aspects of Social Phenomena
Nonrenewable Resources
Renewable Resources
Geothermal Energy
Introduction to Acoustics
Noise and Vibration Control
Advanced Instrumentation Techniques
Intermediate Fluid Mechanics
Fundamentals of Combustion Engines
Turbomachinery I, II
Viscous Flow
Compressible Flow
Propulsion
Energy Systems Design
Solar Heating and Cooling Systems
Heating, Refirgeration, and Air Conditioning
Fundamentals of Environmental Control I, II
Environmental Control Processes I, II
Air-pollution Meteorology
Experimental Methods of Environmental Control
Advanced Thermodynamics
Nonequilibrium Thermodynamics
Energy Technology
Nuclear Reactor Engineering I, II
Heat Conduction
Convective Heat and Mass Transfer
Radiation Heat Treansfer
Power Systems
Combustion
Wind Energy
Statistical Thermodynamics
Research
Thesis Research
Theory of Turbulence
Advanced Reading and Research
Disseration Research
Applications of Linear and Nonlinear Optimization Theory
Linear Programming
Forecasting Techniques
Digital Systems Simulation

Program: Environmental Civil Engineering (B.S., M.S.)

Hours required for major: Semester - (B.S.) 131, (M.S.) 33
Program Inception: (B.S., M.S.) 1973
Staff Size: one assistant professor (1 Ph.D.) and three to four guest professors
Enrollment: (B.S.) 50 (estimated), (M.S.) 12-15 (estimated)
Graduates (1976): (B.S.) 3-4 (estimated), (M.S.) not available
Placement: not available
Graduate Work: not available

Courses

Analytical Methods in Engineering III
General Biochemistry
Design of Metal Structures
Design of Reinforced Concrete Structures
Prestressed Concrete Structures
Waste Water Treatment
Advanced Hydrology
Water Resources Engineering I, II
Advanced Sanitary Engineering Design
Environmental Microbiology
Environmental Chemistry
Solid Waste Disposal
Environmental Impact Assessment
Advanced Waste Treatment Process Design
Industrial Waste Treatment
Pollution Transport System
Research
Thesis Research
Administration of Engineering Contracts
Engineering Law
Economic Analysis in Engineering Planning
Materials Recycling and Recovery
Numerical Methods in Engineering
Fundamentals of Environmental Control II
Environmental Control Processes I
Microbiology
Urban Development Planning

Program: Environmental Modeling (M.S.)

Hours required for major: Semester - (M.S.) 24 plus thesis
Program Inception: 1974
Staff Size: one associate professor (1 Ph.D.) plus six adjunct professors
Enrollment: 11
Graduates (1976): 2-3 (estimate)
Placement: not available
Graduate Work: not available

Courses

Analytical Methods in Engineering I, II
Atmospheric Physics for Engineers I, II
Numerical Methods in Engineering
Research
Thesis Research
Advanced Numerical Methods in Engineering
Intermediate Fluid Mechanics
Viscous Flow
Hydrodynamics
Air-pollution Meteorology
Energy Technology
Reaction Kinetics
Convective Heat and Mass Transfer
Radiative Heat Transfer
Special Topics in Heat and Mass Transfer
Theory of Turbulence

Program: Acoustics (M.S., D.Sc.)

Hours required for major: Semester - (M.S.) 24 plus thesis, (D.Sc.) individually arranged
Program Inception: (M.S., D.Sc.) 1969
Staff Size: two associate professors (Ph.D.) plus ten adjunct professors
Enrollment: (M.S.) 3, (D.Sc.) 1
Graduate (1976): (M.S.) 6, (D.Sc.) 1
Placement: not available
Graduate Work: not available

Courses

Analytical Methods of Engineering I, II, III, V
Special Topics in Engineering Analysis
Probability and Statistics of Metrology
Analytical Mechanics
Introduction to Acoustics
Random Process Theory I, II
Time Series Analysis
Noise and Vibration Control
Advanced Theoretical Acoustics
Acoustical and Mechanical Measurements
Physical Acoustics
Psychological and Physiological Acoustics
Human Factors in Engineering
Special Topics in Acoustics
Research
Thesis Research
Aeroacoustics

Nonlinear Acoustics
Theory of Random Vibration
Structural Acoustic Interaction
Advanced Reading and Research
Dissertation Research
Theory of Vibrations
Structural Dynamics
Intermediate Fluid Mechanics
Theory of Turbulence

Legislation

DISTRICT OF COLUMBIA AIR

TITLE:

Air Pollution Control Act
Public Law 90-440

PURPOSE:

To provide for the enhancement of air resources in the district, and to promote the public health and welfare.

DEFINITIONS:

ADMINISTERING AUTHORITY:

District of Columbia Council

AUTHORIZATIONS:

To issue air pollution control regulations;
To adopt air contaminant limitations;
To conduct research and investigations regarding air pollution;
To cooperate with adjacent jurisdictions in air pollution matters.

PROHIBITED ACTS:

To violate any regulations adopted under the act.

PENALTIES:

Fines of up to $300 or 90 days imprisonment.

DISTRICT OF COLUMBIA SOLID WASTE

TITLE:

Solid Waste Law
District of Columbia Code 6-501

PURPOSE:

To provide for the collection and disposal of solid waste in the district.

DEFINITIONS:

ADMINISTERING AUTHORITY:

Department of Sanitary Engineering
Commissioners of the District of Columbia

AUTHORIZATIONS:

To issue regulations relating to garbage collection and disposal;
To contract for or to maintain solid waste disposal facilities;
To acquire and operate two incinerators;
To enforce the act.

PROHIBITED ACTS:

To burn refuse other than at one of the incinerators.

PENALTIES:

Fines of up to $100 or 60 days in jail.

DISTRICT OF COLUMBIA WASTE WATER

TITLE:

Federal Water Pollution Control Act
Public Law 92-500

ADMINISTERING AUTHORITY:

Department of Environmental Services
Bureau of Air and Water Quality Control

Water pollution control for the District of Columbia is governed generally by the Federal Water Pollution Control Act. Other federal statutes relating to water pollution supplement the basic legislation.